Unit III

Developing Solutions and Spreading the Word

- What steps are being taken to prevent marine debris?
- Who is working on the problem?
- What can concerned individuals do to help?

Tom O'Hara

Developing Solutions and Spreading the Word

Many governments, organizations, and individuals are actively working to develop solutions to the marine debris problem. Some of these groups are developing educational programs to encourage people to use ***prevention****, the most effective way to reduce marine debris. Other organizations are conducting projects aimed at removing debris from the marine environment through beach cleanups, adopt-a-beach programs, and other initiatives. In addition,* ***international*** *laws, as well as local, state, and federal legislation, have been established to regulate commercial and recreational activities that frequently result in the generation of marine debris.*

What Are Governments Doing to Address Marine Debris?

In 1973, the International Maritime Organization, the United Nations agency responsible for international shipping, formed an agreement addressing marine pollution known as MARPOL. This agreement consists of two **annexes** that regulate the disposal of oil and hazardous chemicals at sea. As of 1992, 50 nations had signed this agreement. MARPOL was amended in 1978 to include three additional annexes addressing hazardous materials, sewage, and trash. Under Annex V, the amendment regulating the disposal of garbage at sea, packing materials may not be dumped closer than 25 miles from land, and food wastes and other trash may be disposed of no closer than 12 miles from land. The disposal of plastic materials (including fishing nets, ropes, and bags) is prohibited under any circumstances. The 1978 annexes are "optional," meaning that nations may elect to adopt them or not. As of January 1992, 52 countries had signed Annex V.

In 1988, the Marine Plastics Pollution Research and Control Act (MPPRCA) was passed, requiring all U.S. ships to comply with the provisions of MARPOL Annex V. In addition to prohibiting U.S. ships from dumping plastic items in the sea, all such vessels are required to institute shipboard waste management plans. The law also banned the disposal of plastics within 200 miles of the United States by **foreign** nations, regardless of whether or not they are Annex V signatory nations. The U.S. Coast Guard (USCG) is responsible for enforcing these regulations.

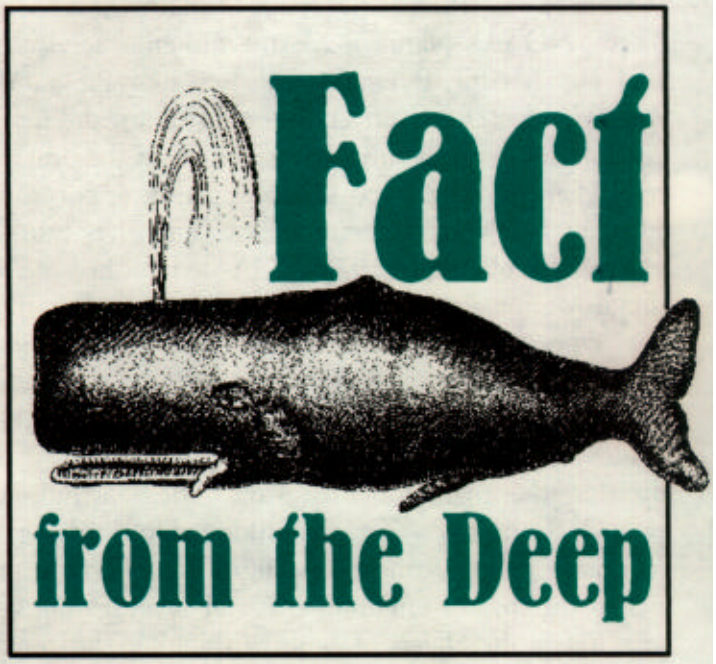
While government-owned vessels are currently exempt from MARPOL Annex V, MPPRCA required all U.S. public ships, including Navy vessels, to comply with the regulations by 1994. The Navy has already begun researching options for reducing shipboard waste and for separating and compacting plastics for disposal at ports. The Navy is also developing educational

programs to encourage all of their ships to take steps now to reduce waste generation.

Several other U.S. agencies also are engaged in efforts to address marine debris. Much of this activity has resulted from the work of an interagency task force on Marine Debris, which was formed by the White House and chaired by the National Oceanic and Atmospheric Administration (NOAA). In 1988, the task force published its final report, which recommended steps that the U.S. Government should take to reduce marine debris. The report recommended that government agencies, including the U.S. Environmental Protection Agency (EPA), NOAA, USCG, the Department of Interior (DOI), and the Navy, undertake a cooperative effort to deal with the marine debris problem. The report also recommended that industry and environmental groups, as well as local governments, be included in this cooperative effort.

One of the first steps taken by these federal agencies has been the identification of sources of marine debris. EPA, along with NOAA, are cosponsors of the Center for Marine Conservation's (CMC) National Beach Cleanup Campaign, during which volunteers record the types and quantities of marine debris they collect. EPA also has been conducting field studies at harbors and sewage treatment plants to record the types of debris that are found. In addition, EPA, NOAA, and the National Parks Service are all working with CMC to develop other marine debris monitoring programs to collect more precise data for statistical analysis. These data will be used to examine long-term trends in marine debris to determine which solutions are effective and which sources of marine debris will require further control efforts.

Activities already are being undertaken to target the sources of marine debris and reduce the quantity of debris they generate. For example, EPA, in cooperation with the plastics industry through the Society of the Plastics Industry (SPI), is examining the sources of plastic resin pellets in the marine environment. Once this research has been completed, EPA and industry representatives will recommend measures to control the release of pellets. In addition, EPA and USCG are developing guidelines to reduce the solid waste released into coastal waters during shipping operations. EPA also is regulating



High Seas Drifter

It seems that nowhere is free from marine debris. Even in Antarctica, one of the most isolated areas on earth, marine debris is commonly found washed up on the shore by researchers studying the area. Antarctica is visited by so few people that most of this debris could not have come from the local area. Instead, the debris enters the ocean hundreds or even thousands of miles away, and then drifts to these remote beaches. It is a disturbing thought that, if current trends continue, more marine debris than people will ever reach the shores of Antarctica.

stormwater sewer systems to reduce the quantity of debris that is released to the marine environment from these sources.

Finally, as a result of recommendations of the interagency task force, the federal government is sponsoring public educational campaigns on marine debris. A central effort to this campaign is NOAA's Marine Debris Information Office, which is operated by CMC and co-funded by EPA. Through this office, information is distributed on the problems associated with marine debris, as well as potential solutions. These federal agencies also are developing educational materials and initiating beach cleanup efforts to increase public awareness of the marine debris issue.

Several other federal activities were undertaken before the final report of the Interagency Task Force was completed. In 1984, under the Department of Commerce, NOAA's National Marine Fisheries Service created the Marine Entanglement Research Program to study the causes and effects of pollution on the marine environment and its inhabitants. Through the program, researchers investigate possible mitigation opportunities and educate debris generators about how they can help lessen the problem. In 1978, NOAA established the National Marine Pollution Program, which studies different types of ocean pollution. With the help of representatives of the shipping, plastics, and commercial fishing industries, conservation groups, the Navy, and academia, the program has established priorities for addressing the marine debris issue. These include improved techniques for handling shipboard waste, increasing people's understanding of the effects of plastics in the marine environment, and investigating ways to mitigate the effects of "ghost fishing" by lost or discarded nets.

Another federal effort is the Marine Mammal Commission, which was established in 1974 as part of the Marine Mammal Protection Act. The commission reviews federal agency actions or programs that may affect marine mammal protection and research efforts. The commission has been active in supporting the Marine Entanglement Research Program, studying marine debris effects in select U.S. waters, and helping start beach cleanups and data-gathering projects in several states.

On the state and municipal level, laws and ordinances are being passed to address the management of different types of trash, many of which can become marine debris. For example, many states have passed bottle-deposit laws to encourage the recycling of beverage cans and bottles. Data from CMC's 1990 Beach Cleanup show that there were significantly fewer bottles and cans on beaches in states with deposit laws, suggesting that these regulations are having an effect. Some states have also enacted legislation requiring the use of certain items such as photodegradable six-pack rings. Many states and communities also have implemented littering laws, which will help prevent trash originating on land from becoming marine debris.

What Are Private Organizations Doing to Address Marine Debris?

Private industry, non-profit research organizations, and **environmental groups** also are working to find ways to prevent and reduce marine debris. One of the most widely recognized efforts is the annual beach cleanup organized by CMC, which has been held annually each fall since 1986. Through the cleanup, CMC mobilizes thousands of volunteers in the United States and several other countries to scour the coast, recording **data** on the types of debris found on U.S. coastlines. The data are logged in the National Marine Debris Database, which is used by CMC and other researchers as a tool to study the nature of marine debris and measure the impact of attempts to reduce it. Beyond cleaning beaches, the program serves to increase **awareness** of marine debris and improve our understanding of the problem. Other environmental groups, including the

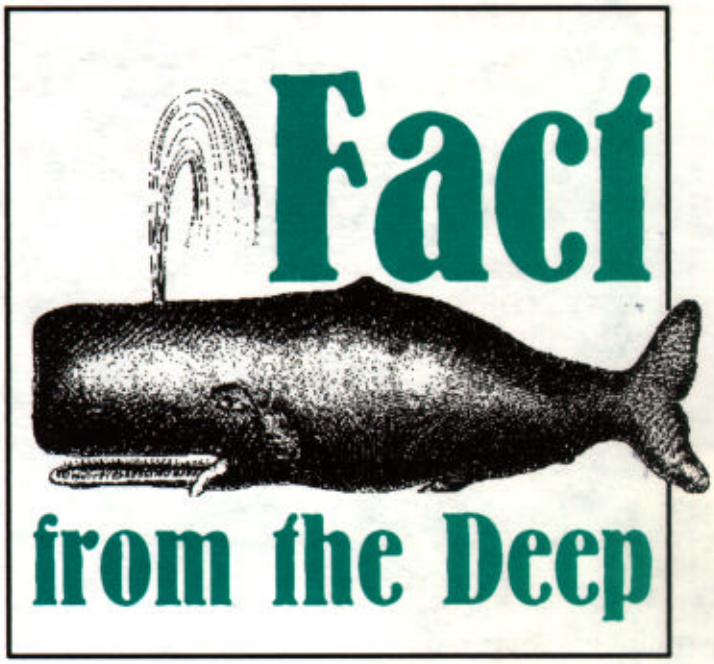
Clean Ocean Action – New Jersey

Natural Resources Defense Council and the World Wildlife Foundation, have established educational programs that outline steps that people can take to stop marine debris in their own communities.

In addition, several different **business and industry** groups have initiated projects aimed at reducing or preventing trash in the marine environment. In the 1980s, plastics manufacturers began to organize research and educational efforts aimed at minimizing the effects of plastics in the oceans, lakes, and rivers. To reduce the persistence of these items, photodegradable plastics have been developed for use in six-pack rings and other particularly harmful items. Additional work has been done to increase the feasibility of plastic recycling. Many frequently used plastic containers, especially beverage containers such as soft-drink bottles and milk jugs, can now be recycled.

The plastics industry, through the SPI, is also engaging in an education **campaign** aimed at both plastics producers and consumers alike. Information kits, industry briefings, and public service advertisements have been used to reach industry members to spread the word about plastic items that manufacturers can prevent from becoming marine debris, such as resin pellets. Educational efforts have also been directed at recreational boat owners, marinas, and commercial fishing operations. Finally, SPI supports other federal and private efforts to address the problems of marine debris, such as CMC Beach Cleanup Campaigns and EPA's plastic pellet study.

Other industry groups also have taken action to prevent their businesses from contributing to the generation of marine debris. In 1987, a coalition of Pacific Coast commercial fishermen sponsored the North Pacific Rim Fisherman's Conference on Marine Debris. The conference included representatives from commercial fishing fleets from all over the Pacific, and established a set of goals and recommendations for all fishing vessels to follow. The petroleum industry has initiated educational programs to encourage offshore oil platform operators and employees to properly dispose of all generated waste. Port authorities in the United States also have begun to address the issue, focusing on how to facilitate compliance with the provisions of Annex V requiring portside garbage disposal facilities.



Beach Cleanups

The Center for Marine Conservation's 1990 Beach Cleanup covered 26 states and 3,656 miles of coastline in the United States, netting over 2 1/2 million pounds of trash. Over 100,000 volunteers took part in the effort. In addition to paper plates, plastic bags, and other trash, they found a rubber alligator, a sofa, two egg cartons complete with eggs—and 10 kitchen sinks! By the end of the cleanup, four sinks had been found in Florida, two each in New York and Maine, one in Delaware, and one in Virginia. While the presence of the sinks is proof that *anything* can become marine debris, the fact that they were found, recorded, and removed also demonstrates the resolve of dedicated individuals working to reduce the amount of trash in the marine environment.

What Can I Do?

While governments and private organizations have become increasingly active in combatting marine debris, individual initiative remains one of the best ways to tackle ocean pollution. By taking action, whether properly disposing of all waste, cutting down on the amount of waste produced, organizing local marine debris projects, or joining the efforts of larger organizations, citizens of all ages can help reduce marine debris and increase public awareness of the problem.

Linda Maraniss/CMC

There are often clear connections between our individual behaviors and the effect of these activities on the environment (for example, the candy wrapper littered on the street can easily be washed into a storm sewer and carried to the sea). Since prevention is the simplest and most effective way to reduce marine debris, individuals can begin by examining their **lifestyles**, considering how much garbage they generate, and where it all ends up. To reduce the possibility that any of their trash will become marine debris, people can make sure that all of their waste is properly disposed of. For example, when outdoors, especially at the beach or on a boat, preventing any litter from blowing away or being left behind will help. People also can recycle as much trash as possible and practice waste prevention techniques, such as reusing items like bags and containers rather than throwing them away.

The effectiveness of concerned individuals can be multiplied by organizing into groups to address marine debris in the **community** or region. For example, groups can come together out of concern for a nearby beach or other site, learning how it is being affected, cleaning the area periodically, and informing others about the project. Such "adopt-a-beach" programs can be very effective ways to educate the community about the impact of marine debris and what needs to be done to prevent it. Marinas can organize education campaigns to alert recreational boaters to the need to store waste for proper disposal on land. Boaters can also organize watchdog groups to observe and report any illegal dumping. One such group, the "Citizen Pollution Patrol," is a network of boaters committed to preventing the generation of marine debris. Organized after ratification of MARPOL Annex V by the United States, this group reports suspected violations of the regulations, and helps other boaters understand and comply with the law.

Established organizations working to stop marine debris are always looking for more people to help them organize and staff their programs. For example, individuals of all ages can **volunteer** for certain short-term projects, such as CMC's annual beach cleanups. Many young people take part in these cleanups every year. Not only do students get a chance to help protect the environment through such efforts, but they also can witness the marine debris problem firsthand. In addition to CMC, the National Marine Fisheries Service and the U.S. Fish and Wildlife Service also oversee a network of volunteers that respond to marine animal strandings and entanglements. Many state and local environmental agencies also maintain a volunteer corps to help educate people about marine debris.

Young people can also take action to prevent marine debris and educate others about the problem through a variety of youth organizations, such as Kids Against Pollution and local chapters of Boy or Girl Scouts of the United States of America. Students can learn more about aquatic environments and the wildlife that lives there by visiting museums, aquariums, and nature reserves. They also can read books and magazines and watch television shows on these topics. In addition, young people individually can make a difference in their communities by organizing cleanups, by writing letters, and by talking about environmental issues with parents and friends.

At a time when many environmental problems seem beyond individual action, marine debris is an area where people of all ages can make, and have already made, a real difference.

Key Points

Prevention is the most effective way to stop marine debris. The United States and other countries, private organizations, and individuals are taking action to prevent debris from entering the marine environment. In addition, U.S. federal agencies are cooperating to address the marine debris problem.

MARPOL Annex V is the first international legislation to regulate the disposal of garbage at sea. Federal, state, and local legislation also has been passed addressing ocean disposal, encouraging recycling, and banning particularly harmful plastic items.

Many conservation groups have been working to stop marine debris, developing educational programs and lobbying for additional U.S. and international legislation. Prominent among these is the Center for Marine Conservation's annual beach cleanup, which mobilizes thousands of volunteers to remove marine debris from the nation's beaches.

Industry groups are addressing the problem by educating their members about marine debris and sponsoring conferences and research projects.

Individuals can make a difference in their daily lives by reducing the amount of waste they produce and ensuring that the remainder is recycled or disposed of properly.

People who want to become more involved can let their elected representatives know how they feel, organize projects within their community, and join established marine debris prevention programs.

Nations and Neighbors

Objective: To understand that marine debris is a global issue and to learn about international efforts that can help pevent its generation, such as MARPOL Annex V.

Activity: Students find MARPOL signatory nations on a map and learn how marine debris can drift between these countries. As a class, students discuss how MARPOL Annex V regulates the disposal of garbage at sea. Students also learn how people in some of these countries say "Save Our Seas," and make up a song with the phrases.

Vocabulary: annex, foreign, international

Materials:

- A world map
- Three different colors of yarn
- Tape
- Scissors
- One "MARPOL Annex V Countries" handout for each student in the class
- One "I Am a Piece of Trash From..." handout

Subjects: Language Arts, Music, Social Studies

Learning Skills: Analyzing, Decision-Making, Observing, Visualizing, Writing

Duration: 40 minutes

1 Before the lesson, cut apart the names of the different MARPOL signatory nations from the "I Am a Piece of Trash From..." handout. Crumple up the pieces of paper and put them in a bag. (Note: This handout might be out of date, as some countries have changed their names or no longer exist.)

2 Provide each student with a copy of the "Marpol Annex V Countries" handout. Assign one of the signatory countries to each student in the class. Ask the students to imagine that they live in that country. Have them find their country on the map.

3 Then, pass around the bag with the crumpled up pieces of paper and have the students pick out one each. Tell the students that these pieces of paper represent pieces of marine debris from all over the world. Have the students open their piece of "trash," read where it came from, and identify the country on the map. (Note: If any students get a piece of trash from the country they "live" in, ask them to pick another.) Ask three volunteers to indicate on the map with a piece of colored yarn how their trash could have traveled from its original country to the country in which it ended up. Tape the pieces of yarn to the map. (Note: Have each student use a different color of yarn.)

4 For each example, ask the class if the trash could have drifted to any other coastal countries on the map. Which ones? Also ask if the trash could *not* have drifted to certain coastal countries. Which ones?

5 Also discuss with the class:

- Do oceans have borders as countries do? Why or why not?
- Can a country by itself stop all debris from washing up on its beaches?

6 Introduce the students to MARPOL Annex V. Tell them about its passage as a result of international concern about marine debris. Briefly discuss how it restricts the disposal of garbage (like food, metal, and paper waste) at sea and prohibits the ocean dumping of plastics. Emphasize that through this legislation many countries from all over the world joined together to stop ships from contributing to marine pollution.

7 Have the students learn the phrase "save our seas" in one of the following languages:

- Rettet Unsere Meere (German)
- Sauvons Nos Mers (French)
- Salvate i Nostri Mari (Italian)
- Salva Nuestros Mares (Spanish)

8 Help them put together a song made up of these phrases.

Other Directions

Ask students to write a story about the journey of their piece of trash. Students might imagine that they are a glass bottle or a soda can drifting through the oceans, or some other piece of trash (such as a toy or a piece of fishing line). Using their social studies book or an encyclopedia for reference, students should research the country where the trash started from, as well as the country on which it washed ashore. Compositions should include this information, as well as explain the ocean(s) the trash traveled through on its journey. Other countries the trash could have landed on during its journey can also be mentioned. The stories can finish by mentioning how the students would recycle or dispose of this piece of trash if they really found it on a beach.

Ask students to investigate local legislation concerning marine debris (such as local boating ordinances and littering laws) to learn how their own community is working on preventing marine pollution. The investigation can include use of the school or public library, as well as interviews with parents, faculty, town representatives, or other municipal officials. (Note: Students might like to tape their interviews to share with the class.)

Ask students to think about what other types of laws could help reduce or prevent marine debris. Then have students write a letter to their congressperson or senator expressing their concern about marine debris, along with their ideas on how the United States can become part of the solution. (Note: Students can also write letters to other individuals or officials, from the mayor of their community to the President of the United States).

Conduct a poster contest in which students design posters for recreational boaters. The posters should explain the types of damage that marine debris can cause vessels, as well as the requirements that pertain to boaters under MARPOL Annex V. Posters can be placed around town and in the local marina. (Note: Be sure to check with the appropriate authority before displaying the posters.)

MARPOL Annex V Countries

Algeria
Antigua and Barbuda
Austria
Bahamas
Belgium
China
Colombia
Cote d'Ivoire
Cyprus
Czechoslovakia
Denmark
Ecuador
Egypt
Finland
France
Gabon
Gambia
Germany
Greece
Hungary
Iceland
Italy
Jamaica
Japan
Lebanon
Lithuania
Luxembourg
Marshall Islands
Netherlands
North Korea
Norway
Oman
Panama
Peru
Poland
Portugal
Russian Federation
St. Vincent and Grenadines
Spain
Suriname
Sweden
Switzerland
Togo
Tunisia
Turkey
Tuvalu
United Kingdom
United States
Uruguay
Vanuatu
Yugoslavia

"I am a piece of trash from . . ."

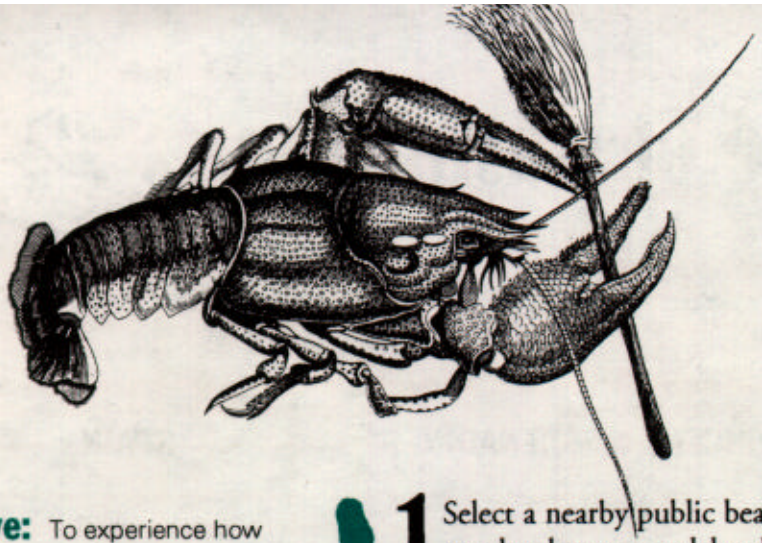
ALGERIA	ANTIGUA AND BARBUDA	AUSTRIA
BAHAMAS	BELGIUM	CHINA
COLOMBIA	COTE D'IVOIRE	CYPRUS
CZECHOSLOVAKIA	DENMARK	ECUADOR
EGYPT	FINLAND	FRANCE
GABON	GAMBIA	GERMANY

"I am a piece of trash from . . ."

GREECE	HUNGARY	ICELAND
ITALY	JAMAICA	JAPAN
LEBANON	LITHUANIA	LUXEMBOURG
MARSHALL ISLANDS	NETHERLANDS	NORTH KOREA
NORWAY	OMAN	PANAMA
PERU	POLAND	PORTUGAL

"I am a piece of trash from . . ."

RUSSIAN FEDERATION	ST. VINCENT & GRENADINES	SPAIN
SURINAME	SWEDEN	SWITZERLAND
TOGO	TUNISIA	TURKEY
TUVALU	UNITED KINGDOM	UNITED STATES
URUGUAY	VANUATU	YUGOSLAVIA



Clean Sweep

Objective: To experience how marine debris can affect a community and to discover that by taking action people can make a difference.

Activity: As a class, students organize and conduct a cleanup of a local beach, lake, or stream. Students keep track of the types and amounts of trash picked up and analyze this information in the classroom. As a class, students discuss the marine debris problem in their community and consider ways to prevent it.

Vocabulary: community, data, lifestyle, prevention, volunteer

Materials:

- One kitchen-sized garbage bag for each pair of students in the class (Note: If collected items will be separated for recycling, additional kitchen-sized garbage bags will be necessary)
- One pair of latex gloves for each student in the class
- One "Cleanup Card" handout for each pair of students in the class

Subjects: Mathematics, Science, Social Studies

Learning Skills: Analyzing, Classifying, Collecting Data, Decision-Making, Observing, Working in Small Groups

Duration: Two 40-minute periods

1 Select a nearby public beach for the class cleanup. Public land adjacent to a local stream or lake also can be used. (Note: The appropriate municipal or state agency responsible for the site should be notified prior to the cleanup.)

2 To prepare for the cleanup, explain the "Cleanup Card" handout to the students and demonstrate how to record the items they find. (Note: You may want to use this as an opportunity to show recycling in action. Have the students separate easily identifiable recyclable materials, such as bottles, cans, and newspapers, into bags for recycling.) Be sure to explain carefully safety procedures to be observed while collecting debris, including wearing safety gloves and not handling sharp objects or items they don't recognize.

3 Once on site, have students pair up. One student in the pair should carry the bag for trash (and a bag for recyclables, if they will be separating these), and actually gather the debris. As the first student collects the trash, both students should try to identify the item. The second student then records the information on the "Cleanup Card." Ask students to record the sources of the debris whenever possible. At the end of the cleanup, be sure that all the debris is properly disposed of.

(Note: The Center for Marine Conservation operates annual beach cleanups across the country. You may want to incorporate its program with this lesson, allowing the class to work with adults to clean up a site. The beach cleanups are scheduled for late September/early October and take about 3 hours. The Center for Marine Conservation also publishes a pamphlet entitled "All About Beach Cleanups," describing how people can organize their own beach cleanups. See the "Resources" section at the back of this guide.)

4 Back in the classroom, have the students total the amounts of debris found for each category listed on the "Cleanup Card." They should also add all of these numbers and put the total number of items found in the space provided on the bottom of the card. (Note: You might write these numbers on the board to come up with a class total for each category, as well as a grand total for all of the pieces of debris found.) Discuss any trends found:

- Was there a prevalence of certain types of items? Where might these items have come from (for example, from boaters, from sewers, from people who threw their trash on the ground, or other sources)?
- What were some of the most unusual types of debris found? Where might these items have come from?
- Which types of debris could pose problems to area wildlife? How?
- Will beach cleanups solve the marine debris problem? Why or why not?
- What are some steps we can take to prevent marine pollution in the first place?

5 Ask the students to consider how the lifestyles of the community residents may have contributed to the collected debris. Did they find any items that they or their parents use every day? Have them consider ways they could prevent these items from appearing on their beach, including recycling, proper disposal, and other pollution prevention techniques.

Other Directions

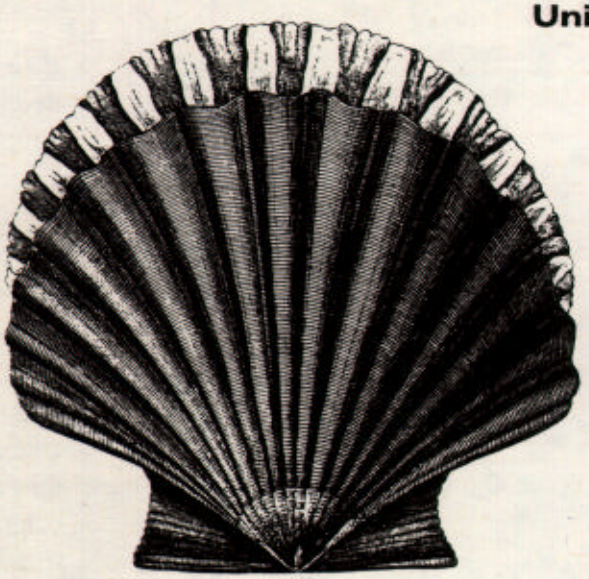
Have the class publicize its cleanup day or prepare an exhibit after the event. (Note: If this option is selected, be sure to save a few samples of marine debris from the cleanup.) See the "Campaign for a Clean Future" lesson in this unit for more details on these and other publicity activities.

Have the class adopt the cleanup site or another area for the semester or the school year. This will involve making regular tours to the site to keep it clean, as well as educating the community about the site, its natural inhabitants, and how to keep it clean.

Cleanup Card

	ITEM	NUMBER	TOTAL
PLASTIC	Bags		
	Bottles		
	Fishing line/nets		
	Six-pack holders		
	Cigarette filters		
	Straws		
	Other		
		Total Plastic:	
FOAMED PLASTIC	Cups		
	Fast-food containers		
	Other		
		Total Foamed Plastic:	
PAPER	Cups		
	Bags		
	Newspaper/magazines		
	Other		
		Total Paper:	
GLASS	Bottles		
	Pieces of glass		
	Other		
		Total Glass:	
METAL	Cans		
	Bottle caps		
	Other		
		Total Metal:	
RUBBER	Balloons		
	Tires		
	Other		
		Total Rubber:	
MISCEL-LANEOUS	Pieces of wood		
	Pieces of clothing		
		Total Miscellaneous:	
		Total:	

Campaign for a Clean Future



1 Introduce the class to the idea of a public education campaign by comparing it to a political campaign such as an election or a fundraising event for a local church or civic group. Indicate that while those campaigns seek to win votes or raise money, the campaign the students will develop will help prevent pollution and protect the environment.

2 As a class, decide whether the campaign will be directed at the faculty, staff, and students of the school or all the members of the community. (Note: Most of the projects can be tailored for either the school or the entire community.) If possible, use the campaign to promote an actual beach cleanup, community cleanup campaign, recycling campaign, or other event.

3 Have the class create a slogan for the campaign, such as "Save Our Seas—Stop Marine Debris," or "Join the Partners for Pollution Prevention." The slogan should attract the interest of the intended audience and reflect the goal of the campaign. Students may want to design an icon or symbol to accompany the slogan, such as a drawing of a seal pup or a gull. The slogan and symbol should appear in all campaign materials and events. Depending on available time and the interests of the class, some of the following projects can be undertaken to publicize the event:

- **Posters.** Divide the class into pairs, and have them design and paint a poster about marine debris. The poster should incorporate the campaign slogan, provide facts about marine debris, and suggest ways to prevent it. If the campaign is promoting an actual event, the students also should include on the posters the most important details about the project (such as the date of the event, the location, and the time scheduled). Students may want to contact the municipal office that handles marine pollution issues or the local Department of Public Works to ask if they can include a phone number for people to call for more information. The posters can then be displayed in the school, at the beach, or in town. (Note: Be sure to check with the proper authority before displaying the posters.)

Objective: To educate the community about marine debris and how to prevent its generation.

Activity: Students develop a public education campaign on marine debris to raise the awareness of the school or the whole community. Students develop campaign slogans, buttons, posters, bumper stickers, press releases, and other materials. The campaign can be used in conjunction with an actual community litter cleanup day, a beach cleanup, a storm sewer stenciling activity, or other community event.

Vocabulary: campaign, press release

Materials:

➢Will vary with activity

Subjects: Art, Language Arts, Science, Social Studies

Learning Skills: Analyzing, Collecting Data, Decision-Making, Interviewing, Researching, Visualizing, Working in Small Groups, Writing

Duration: Two to three 40-minute periods

- **Bumper Stickers/Buttons.** Have students individually or in pairs design and produce bumper stickers or buttons. Simple buttons can be made of white or colored card stock and worn using a safety pin. Bumper stickers can simply be strips of paper that are then posted on a wall (not actually put on cars). These items should include the campaign slogan and icon and, if possible, a brief point or two about marine debris.
- **Flyers.** As a class, design a campaign flyer. Start with the campaign slogan and then develop the text of the flyer. The text can include interesting facts about marine debris, as well as simple steps people can take to help reduce or prevent marine debris. Once the flyer is produced, it can be copied and distributed in the school. If the campaign seeks to include the whole town, students can distribute it to stores, libraries, and supermarkets. (Note: Be sure to check with the appropriate manager or authority first.) Also be careful not to produce more flyers than needed!
- **Library Exhibit.** Have the students design a table or bulletin board exhibit about marine debris to be displayed in the school or town library. Students can assemble posters, flyers, buttons, and other items they have made. In addition, pictures or photographs of entrapped or entangled animals can be displayed to illustrate the potential dangers of marine debris. Actual samples of marine debris also can be used, and students can ask the librarians to add some relevant books to the exhibit. Exhibit tables or booths also can be set up at school fairs or similar community events. Campaign materials can be displayed on the table, and the class can discuss with booth visitors the types of actions people can take to prevent marine debris. (Note: Before developing any exhibit or booth, check with the proper authority to obtain permission and to get information about size and format restraints for exhibit/booth setup.)
- **Article for the School Newspaper.** Ask the class to compose an article about the marine debris education campaign for the school newspaper. The article should include what students have done and what they hope to achieve, as well as discuss what their schoolmates can do to help. Or, invite a reporter from the school newspaper to a "press conference" at which the class can give a presentation on marine debris. The reporter can then write an article on the campaign.
- **Newspaper Articles/Letters to the Editor.** Have the class write a press release on the campaign for the local paper that discusses what students have accomplished. A reporter from the paper could also be invited to talk to the class. Alternatively, have each student compose a letter to the editor briefly explaining the effects of marine debris, what their class is doing to prevent it, and steps that people in the community can take to support the campaign.

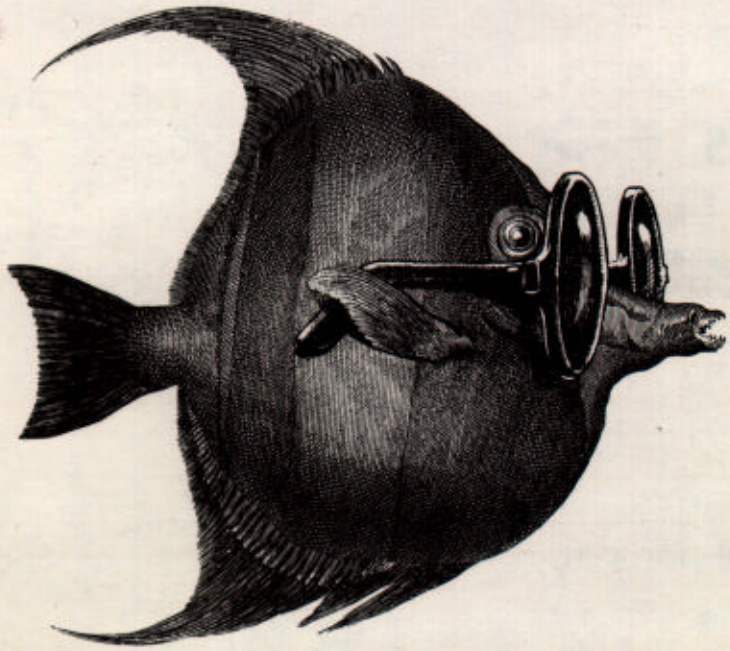
4 After the campaign is over, discuss with the class how well it worked. Have the students think about how much or how little people seemed to know about marine debris. Ask them to consider how changing people's attitudes can be effective in the effort to reduce marine debris.

Other Directions

Make a class video advertising the campaign or illustrating some of the ways marine debris could adversely affect the community. The video also should demonstrate ways that people can prevent ocean pollution. The videotape could be shown in school and then placed in the library for members of the community to borrow.

Develop a public service announcement in conjunction with a local radio station or community access television/local cable television channel advertising the campaign.

Have the class present a play for parents/the community about marine debris. The play can center on a day in the life of a marine animal such as a seal pup or sea turtle. The animal might be shown feeding or swimming with its family, becoming entangled or entrapped, and getting saved by passing boaters. The play can end with a "monologue" by the animal about not polluting the seas, or with the same message in a song sung by the class.



Private Investigations

Objective: To learn about the efforts of private organizations and individuals, both locally and nationally, to prevent marine debris.

Activity: Students investigate what different groups (such as business and industry, environmental groups, and other civic and private organizations) are doing in their area or across the nation to prevent marine debris. Students3 present an oral report on their findings. The class then writes a letter asking a representative of one of these groups to come to the school to discuss the group's efforts.

Vocabulary: business, environmental group, industry

Materials:

➢No special materials needed

Subjects: Language Arts, Science, Social Studies

Learning Skills: Collecting Data, Interviewing, Public Speaking, Reading, Researching, Working in Small Groups, Writing

Duration: One 40-minute period for first library visit; one to two 40-minute periods for additional research; one 40-minute period for oral presentations

1 To get the investigation started, take the class to the library. With the librarian, introduce the students to likely sources of information, including books, encyclopedias, periodicals, telephone books, and directories. (Note: The "Resources" section at the back of this learning guide lists many organizations, and may provide enough information for your needs. An additional reference tool is the *Encyclopedia of Associations,* which is a book found in most libraries that contains the addresses and phone numbers of many kinds of organizations.)

2 Using these resources, have each student develop a list of organizations whose work focuses on the prevention of marine debris and related issues (such as wildlife entanglement and protecting endangered species). Student lists should include government agencies such as EPA and NOAA, industry groups such as the commercial fishing and plastics industries, non-profit organizations including environmental groups and research institutions, and civic or local groups such as recreational boaters and sport fishermen. Assist any students that are having difficulty, so that each student has discovered projects or activities from at least two or three organizations. Students should record the name, address, and phone number of the organizations, as well as a short description of the group and its work.

3 Back in the classroom, list all of the different organizations identified by the students on the chalkboard. Ask student volunteers to briefly describe what each organization does.

4 Divide the class into small groups for further research. Assign each group two or three organizations and have them research the projects their organizations have developed to reduce or prevent marine debris. The school and town libraries will be a primary source of information. Other potential sources of information include environmental organizations, the local newspaper office, and other teachers or parents. The students also can contact the organizations directly, requesting that literature

about the organization be sent to the students by mail. In addition, students can call or visit local officials that are responsible for public health or environmental issues, asking them for more information about the work of their organizations.

5 When the students have completed their research, have each group present short oral reports to share what they found with the class. Afterward, discuss the variety of things that people are doing to prevent marine debris. Have the students consider which methods they think will be most effective and why.

Other Directions

Choose an agency, organization, or business that the students found interesting and have the class compose a letter asking a representative to visit the class. Afterward, have the students write a two- or three-paragraph report on the representative's presentation. The report should describe the organization and what the representative does. The students can also include suggestions for how to implement some of the organization's prevention techniques in the community.

Have the class investigate what their peers may be doing individually or in organizations to protect the oceans or combat marine debris (the *Encyclopedia of Associations* contains a number of children's groups working to protect the environment). Have students develop a report or profile on their findings.

Ask students to research careers in the environment. The students can interview individuals that hold environmental jobs (such as scientists, writers, environmental lawyers, organic farmers, park rangers, town planners, and people in businesses, environmental groups, the government). Students can also look in the library for books, magazine articles, and pamphlets about environmental careers. One book that describes a variety of environmental jobs is entitled *A Complete Guide to Environmental Careers.* Have the students report to the class on their findings. (Note: If students interview a person who works for the environment, they might want to record their interviews on tape to be played for the class.)

Circulating Solutions

Objective: To review the lessons of the guide, as well as to spread the word about marine debris and the solutions that are being developed to reduce or prevent ocean pollution.

Activity: Students compile work from previous lessons to produce books or newspapers to inform people about the issue of marine debris. The books and newspapers address what marine debris is; how it affects people, wildlife, and the environment; and what individuals can do about the problem.

Vocabulary: awareness

Materials:

- "Clip Art" from Appendix C of this learning guide
- For newspapers: one piece of poster board (at least 24 x 36 inches) for each group
- For books: several pages of white or colored construction paper for each student

Subjects: Art, Language Arts, Science, Social Studies

Learning Skills: Decision-Making, Interviewing, Reading, Researching, Visualizing, Working in Small Groups, Writing

Duration: Two to five 40-minute periods

1 Tell the students that they will each be making a book showing all that they have learned about marine debris, including types of debris, sources, and potential dangers. (Note: Students also can work together as a class on this activity, collecting samples of their work from the lessons and compiling them into a single book.) To get started, have each student gather the materials he or she made in the previous lessons, including any charts, essays, drawings, or poems.

2 Next, have the students glue or tape their work onto sheets of construction paper. Students might develop a title page for each major group of activities they have studied (for example, one title page for types and sources, one for effects, and one for solutions). Also, provide copies of the "Clip Art" to the students to help them illustrate the lessons. When all the lessons have been compiled and illustrated, have the students punch holes in the sheets of paper and stitch them together with yarn.

Students also can write a one-page introduction to their books. Ask them to include their personal feelings about marine debris and what potential solutions they think would be most effective. Students might conclude their introduction with a pledge to take specific steps to help prevent marine debris.

When the books have been completed, have the students use them to spread the word about marine debris and how it can be prevented. Books can be shown to friends, parents, neighbors, or they can be "exhibited" in the school library or in the community.

3 Alternatively, have the students work in small groups to develop a newspaper to help inform members of the school and the community about marine debris and what is being done to reduce or prevent it. Discuss with the class what newspapers are for and what kinds of articles, from news stories to editorials, are found in them. Encourage the students to think of themselves as reporters and graphic artists, gathering information on stories they thought up, collecting work from previous lessons, and producing images to tell a story or illustrate one of the articles.

Divide the class into groups of two to four students, and ask each group to design, write, and assemble its own newspaper. (Note: If preferred,

students can produce a single newspaper as a class.) Newspapers should contain features from each of the following categories:

- **Articles.** These comprise the "news" portion of the paper. Articles can have either a light or a serious tone, as long as they convey a marine debris message. The lessons in this guide can be used as a starting point to get the groups thinking about what types of events or activities would make good articles. For example, groups could write a story about the board game from the "Trails and Trials of Trash" lesson, an article about the beach cleanup from the "Campaign for a Clean Future" lesson, or include one of the stories written about the journey of the piece of trash from the "Nations and Neighbors" lesson. Also, encourage the groups the come up with their own ideas for articles.
- **Editorials.** These are the "opinion pieces," in which students describe how they feel about marine debris and discuss what they think should be done to prevent it. Groups might include letters to a congressperson or senator regarding their concerns about marine debris or their compositions from the "All Tangled Up" lesson describing how it would feel to be a marine animal entangled in debris.
- **Illustrations/Cartoons/Photographs.** These are the graphic contributions to the newspaper that illustrate the stories or stand on their own. Examples of such graphics include an advertisement telling readers about the public education campaign conducted in the "Campaign for a Clean Future" lesson, a reproduction of the "Most Wanted" type of marine debris poster created by the class in the "How Harmful Is It?" lesson, or cartoons about marine debris and steps people can take to prevent it.

4 Once all the articles have been written and the graphics prepared, the groups can write headlines for the stories and captions for the illustrations. Then, provide each group with a piece of poster board and copies of the "Clip Art." (Note: You may want to provide both the "Clip Art" and the poster boards in a variety of colors.)

5 Using the clip art, have the students design a masthead at the top of the poster board (clip art graphics can be enlarged with a copier where necessary). Under the masthead, have the students divide the board into three columns (each approximately 8 inches wide). Students can then arrange their articles and illustrations in these columns. Additional clip art illustrations can be arranged between the stories and at the margins. When the layout is complete, have the students glue all the items in place. The finished newspapers can be posted around the classroom, in the hallways, or on bulletin boards around school, as well as in the community.